REMARKS

In Sections 1 and 2 the Examiner has applied a provisional double patenting rejection based on claim 17 of copending Application No.: 10/790,899. In that a US Patent has not issued from Application No.: 10/790,899, and further in view of the clarifying amendment made above to claim 1, this provisional double patenting rejection should be reconsidered after an indication of allowable subject matter is made in the instant patent application.

Claims 1, 2, 7 and 19 are rejected under 35 USC 102(b) as being anticipated by Hou (US 6,596,979) (note that claim 19 depends from claim 13, which is not rejected based on Hou), claims 1, 2, 8-14 and 20-24 are rejected under 35 USC 102(b) as being anticipated by Vock et al. (US 6,320,173), and claims 1-6 and 13-18 are rejected under 35 USC 102(e) as being anticipated by Perregaux et al. (US 6,654,056). These rejections are respectfully disagreed with, and are traversed below.

Col. 5, lines 27-60 of Hou (cited by the Examiner for rejecting claim 1) state only the following:

> Directly above optical lens 274, there is an image sensor 276 comprising an array of photodetectors made of CMOS or CCD sensors. The optical lens 274 collects the reflected light onto the photodetectors that convert the reflected light to electronic signals proportionally representing the intensity of the reflected light. The electronic signals are then transferred to data bus 278 for readout or other operations, for example, in the image signal processing electronics 252 of FIG. 2A. For the scanning object 264 under the panel 266 to be completely scanned, the image sensing module 260 must have a relative movement over the scanning object 264 to scan the entire scanning object 264. Depending on an exact implementation, either the image sensing module 260 or the scanning object 264 is moved across each other by a moving mechanism (not shown in the figure). The relative moving speed is conformed to the image vertical resolution in the resultant image and hence synchronized by a sensor clock signal that may be generated from an oscillating circuit. These are well known in the art and not to be discussed further herein. FIG. 3 illustrates an exemplary layout of sensor elements with associated image signal processing electronics 300. Photodetector array 302 comprises a single row of N photodetectors and each is labeled #1, #2, . . . , #N. During a scanning operation, each of the photodetectors collects image lights cast thereon for an integration period and generates an electronic signal. At the end of the integration period, the electronic signals are amplified in an

> amplifier array 304 and sampled respectively via a sampling circuit array 306. The amplified and sampled pixel signals are sequentially readout through multiplexers 308 as a final serial image signal output 310, wherein the operation of the multiplexers 308 is controlled by a shift register array 312. Optionally, the output signals are amplified via an amplifier 314.

Hou describes a document scanner 100. Figure 3 simply shows the layout of sensor elements with associated image signal processing electronics (amplifiers, sampling circuit, multiplexers and shift register).

It is not understood how the Examiner finds the subject matter claimed in claim 1 in this disclosure of Hou, e.g., where the Examiner finds an express disclosure of "cooperatively analyzing the output signals from at least two spatially adjacent array subelements to establish a data set reflective of an **extent to which output signals responsive to the image of the feature are produced from exactly one or from more than one of the adjacent array subelements,** and to reach a conclusion from the data set **as to a location of the image of the feature on the segmented array**".

If the Examiner maintains this rejection, then a clarification of the rejection is respectfully requested.

Further, claim 1 has been even further clarified by amendment to recite in the last element thereof:

> to reach a conclusion from the data set as to a location of the image of the feature on the segmented array <u>with an accuracy of less than the linear dimension when the output signal is produced from more than one of the adjacent array subelements</u>.

This merely clarifying amendment, which is supported throughout the description and drawings (e.g., see the various ranges shown in Figures 7, 8 and 9 and, for example, paragraph [0035] of the application as filed).

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Clearly claim 1 is not anticipated by, nor is the subject matter of claim 1 suggested by, the document scanner and associated scanner electronics disclosed by Hou.

In that claim 1 is clearly allowable over Hou, then claims 2 and 7, which depend from claim 1, are also allowable for at least this one reason alone. Claim 19, which depends from independent claim 13 (not rejected based on Hou) should also be found to be allowable (without admitting that this rejection is proper).

The reconsideration and removal of the rejection based on Hou is respectfully requested.

Vock et al. disclose a system intended to image and track a golf ball in flight. It is instructive to review col. 12, line 52 to col. 13, line 37 (portions of which were cited by the Examiner in certain of the rejections).

> However, once the ball 120 becomes an extended source relative to the IFOV 126a, then **several detectors can be averaged together to determine, in combination, the signal from the ball 120, and hence the <u>distance</u> to the ball 120**. FIG. 6A illustrates the relationship between ball size and signal strength, in accord with the invention. A FPA 140 is illustratively shown in FIG. 6A as a representative solid state detector array; and a ball's motion is sequentially captured during image framing as images 142a, 142b, 142c and 142d. Note that the ball's overall image size, relative to the pixel IFOV dimensions 144, at positions 142a-142d changes during the flight. At images 142a, 142b and 142c, the ball subtends an angle that is smaller than the IFOV; and therefore the distancing functionality as to $1/R^2$ applies. At image 142e, the ball image is much larger than a given IFOV so that, for example, detectors 146 and 147 image the ball with the same approximate image strength. However, neither detector 146, 147 is used, alone, to determine distance. Therefore, **the signal strengths from all of the detectors which image ball 142e are summed to determine a signal strength; and that signal strength can be used to determine <u>distance</u>**. The analysis above neglects certain key factors, such as: diffraction, ball motion, ball images that cross between two detectors, simultaneous imaging of two balls crossing within the field of regard, optical blur and defocus, and similar effects. At image 142d, for example, the ball image and pixel dimensions are approximately equal. At this special condition, neither technique works particularly well. Nevertheless, there are acceptable solutions to these problems: a combination of the above techniques can be used, the distancing data can be ignored for selected failure conditions, **diffraction effects can be included by**

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> **summing adjacent detectors**, and estimation routines can "bridge" certain data by considering past data, future expected data, and certain physical constraints. FIG. 6B illustrates that golf ball distance can also be determined geometrically because the ball's size is a constant. In particular, if the focal plane 150 is sufficiently dense in IFOV pixels 150a, as compared to the geometric image of the ball over the range, such as illustratively shown by golf ball images 152, 154 (image 152 denoting a "closer" golf ball due to its larger image size; and image 154 denoting a "further" golf ball due to its smaller image size), then the distance to the ball can be determined by a ratio. That is, by calibrating the number of pixels which correspond to a ball's width at, for example, the tee-off position (being at a fixed, known distance from the camera), then subsequent frames readily specify golf ball distance, from the camera, by a ratio between the numbers of detectors which image the linear dimensions of the ball (e.g., **if eight detectors image the ball at fifty yards; then sixteen detectors image the ball at twenty-five yards**).

Vock et al. simply apply the summation of detector pixel outputs to determine a distance to the ball or for compensating for diffraction effects, and also use a ratio of numbers of detectors (pixels) to determine the distance. However, it is not seen where Vock et al. expressly disclose, or suggest, that their technique would, as in each of the independent claims 1, 13 and 24, reach a conclusion from a data set as to:

> "a location of the image of the feature on the segmented array <u>with an accuracy of less than the linear dimension when the output signal is produced from more than one of the adjacent array subelements</u>",

where the "linear dimension" referred to is the linear dimension of an array subelement.

This merely clarifying amendment is also deemed to even further remove the teachings of Vock et al., and to clearly render each of the independent claims 1, 13 and 24 novel and non-obvious in view of the disclosure of Vock et al., including the disclosure of Vock et al. at col. 3, lines 13-25 and col. 7, lines 33-40, which were repeatedly referenced by the Examiner.

Further in this regard, and to reinforce the argument made above, reference can be made to Vock et al. at col. 10, lines 40-46, where they state:

> There is also a positional uncertainty for a ball that is imaged to within a given pixel (that is, a ball's position is, to first order, known only to within the IFOV). **In a preferred embodiment of the invention, therefore, sub-pixel resolution is achieved by considering the ball's track through several pixels, and/or frames, and extracting the most likely position of the ball within a given pixel based upon that track.**

Clearly, this disclosure of Vock et al. does not disclose, and in fact can be seen to teach away from, a method that includes:

> cooperatively analyzing the output signals from at least two spatially adjacent array subelements to establish a data set reflective of an extent to which output signals responsive to the image of the feature are produced from exactly one or from more than one of the adjacent array subelements, and
>
> to reach a conclusion from the data set as to a location of the image of the feature on the segmented array <u>with an accuracy of less than the linear dimension when the output signal is produced from more than one of the adjacent array subelements,</u>

as stated, for example, in claim 1.

In that independent claims 1, 13 and 24 are each clearly allowable over Vock et al., then all claims that depend therefrom are also allowable for at least this one reason alone.

The reconsideration and removal of the rejection based on Vock et al. is respectfully requested.

Turning now to the rejection of claims 1-6 and 13-18 as being anticipated by Perregaux et al., this patent presents another document scanner-type (copier) system. Col. 14, lines 28-36, which were cited by the Examiner in the rejection of independent claims 1 and 13, states only the following:

> At an exposure station B, a controller or electronic subsystem (ESS), indicated generally by reference numeral 229, receives the image signals representing the desired output image and processes these signals to convert them to a continuous tone or grayscale rendition of the image which is transmitted to a modulated output generator, for example the raster output scanner (ROS), indicated generally by reference numeral 230.

It is not seen how this disclosure can be seen to anticipate the subject matter of independent claims 1 and 13.

Further, in making the rejection of claims 1 and 13 the Examiner states the Perregaux et al. disclose a method for "locating a position of a feature in a scene (document)" that includes "forming an image", etc.

The Examiner's attention is respectfully drawn to col. 16, lines 10-12, where Perregaux et al. actually state:

> Conventional sheet path sensors or switches may be utilized to keep track of the position of the document and the copy sheets.

Clearly, the use of conventional sheet path sensor or switches does not disclose the claimed subject matter.

In that independent claims 1 and 13 are each clearly allowable over Perregaux et al., then all claims that depend therefrom are also allowable for at least this one reason alone.

The reconsideration and removal of the rejection based on Perregaux et al. is also respectfully requested.

The Examiner is respectfully requested to reconsider and remove all of the expressed rejections of the claims under 35 U.S.C. 102(b) and 102(e), and to allow all of the pending claims 1-24 as now presented for examination. An early notification of the allowability of claims 1-24 is earnestly solicited

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